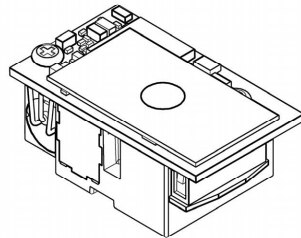
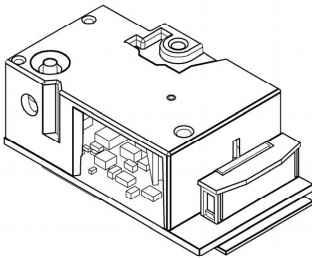




METROLOGIC INSTRUMENTS, INC.  
IS4800 microQuest® Series  
Single-Line Scanning Engine  
Installation Guide



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## INTRODUCTION

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The IS4800 microQuest® series are miniature single-line scan engines designed for direct integration into customer decode-equipped OEM devices.

The microQuest non-decode scan engine is equipped with a multitude of features including:

- 100 Scans per Second, Typical.
- Support for 3.3VDC Input Voltage (IS4813 Model)
- Support for 5VDC Input Voltage (IS4815 Model)
- A 650 nm Bright Laser Diode
- A narrow exit angle to provide precision beam positioning.
- Automatic (Hardware) Scan Sense
- A rugged industry standard size die cast chassis with threaded mounting holes.
- A 10-pin ZIF Connector Industry Standard Pinout for Seamless Integration into Portable Devices
- Low Mass (11 grams) Industry Standard Size



The manufacturer of the end equipment must register with agencies such as the Food and Drug Administration (FDA). The specifications required for registration are not obtainable until the OEM manufacturer uses the microQuest Engine in its final configuration. *Therefore, it becomes the responsibility of the manufacturer who incorporates the scan engine into their product to comply with all federal laser safety regulations.* The manufacturer must submit a Laser Product Report for the FDA in the US. Metrologic will assist its customers in complying with the necessary procedures.



**THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040.  
USE ONLY AS COMPONENT.**



**Caution:** The laser is susceptible to permanent damage if enabled less than 50 ms after the Scan Enable has been activated. This requirement must be strictly adhered to or the limited warranty on page 23 is void. Refer to *Scan Sense Timing* on pages 16 - 17 for additional information.

## MODELS AND ACCESSORIES

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Model	Description
IS4813	Non-Decode, 3.3VDC Scan Engine
IS4815	Non-Decode, 5VDC Scan Engine
19-07335	10-pin Flex Cable

# COMPONENTS OF THE MICROQUEST

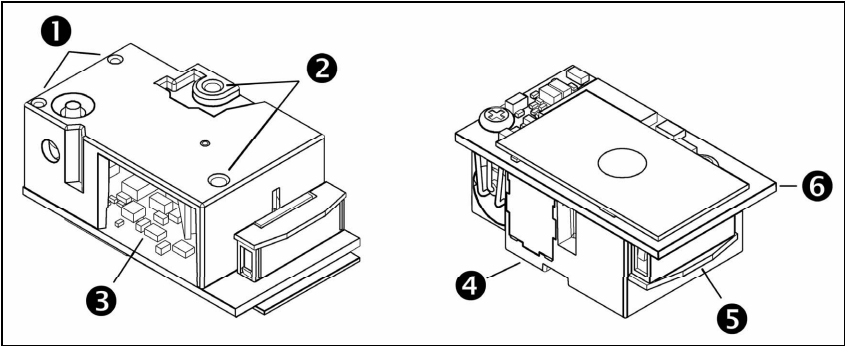



Figure 1. IS4800 Series Components

ITEM NO.	DESCRIPTION
1	Pin Locator Holes ( <i>specifications on page 3</i> )
2	Threaded Mounting Points ( <i>specifications on page 3</i> )
3	Exit Beam Location, Laser Light Aperture  AVOID EXPOSURE – LASER LIGHT IS EMITTED FROM THIS APERTURE
4	Die Cast Chassis
5	10-Pin ZIF Connector
6	Printed Circuit Board

## LABELS

The serial number/model number label is located on engine chassis (*see below*).

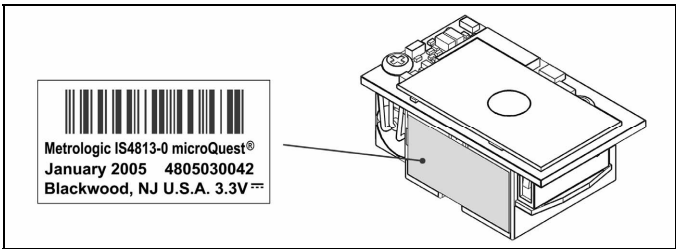


Figure 2. Serial Number Label (*Enlarged For Illustration Purposes*)

MOUNTING SPECIFICATIONS

Scan Engine Dimensions

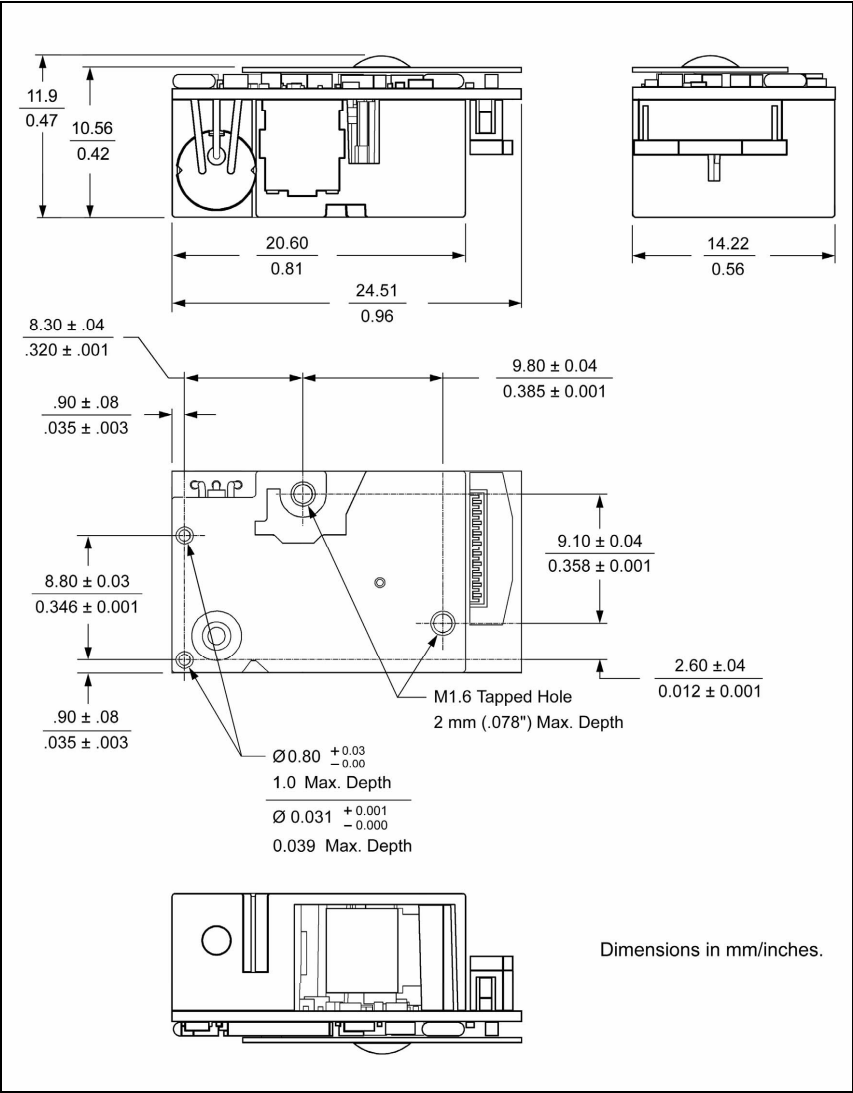


Figure 3. IS4800 Series Dimensions

Specifications are subject to change without notice.

Exit Beam Specifications

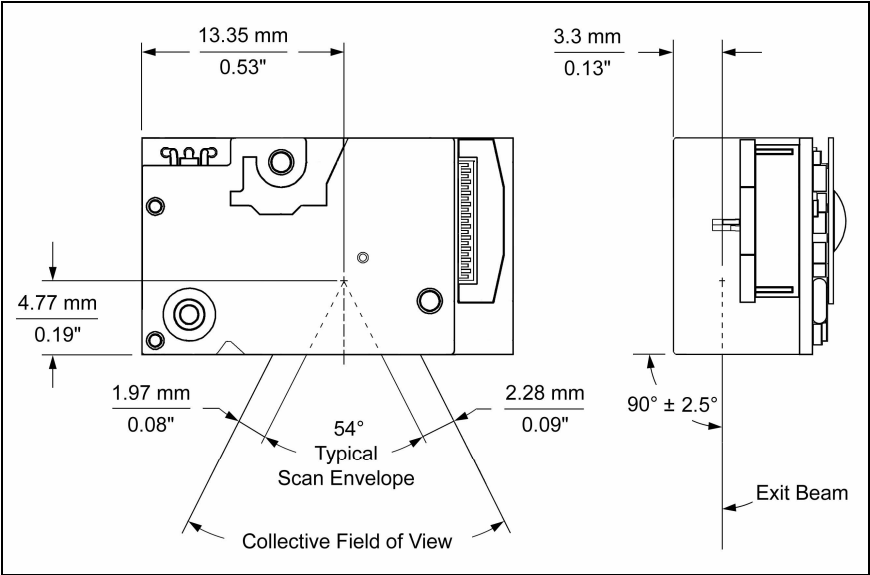


Figure 4. IS4800 Series Exit Beam Specifications

Specifications are subject to change without notice.



### Enclosure Specifications

The IS4800 scan engine series was specifically designed for integration into custom housings for OEM applications. The scan engine's performance will be adversely affected or permanently damaged when mounted in an unsuitable enclosure.



THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040.  
USE ONLY AS COMPONENT.



**The limited warranty (on page 23) is void** if the following considerations are not adhered to when integrating the IS4800 series scan engine into a system.

### Grounding

If the scan engine is going to be installed in a grounded host:

- Use an insulator between the engine chassis and host. The die-cast engine chassis is at +Vcc.
- Use shoulder washers to isolate the screws from the host if the mounting screws are metallic.

### Magnetic Sensitivity

The scan engine can be negatively affected by magnetic fields:

- Use only non-magnetic screws and locating pins.
- Do not mount the engine within 1.00" of any magnetic materials.

### Electrostatic Discharge (ESD) Cautions

The scan engine has exposed electrical components.

- DO NOT touch the leads of the Visible Laser Diode (VLD) or other components.
- ALWAYS use grounding wrist straps and a grounded work area when handling the engine.
- Mount the engine in a housing that is designed for ESD protection and stray electric fields.



ESD has the ability to modify the electrical characteristics of a semiconductor device, possibly degrading or even destroying the device. ESD also has the potential to upset the normal operation of an electronic system, causing equipment malfunction or failure.

## Enclosure Specifications

## Printed Circuit Board (PCB) Component Clearance

**WARNING:** When designing the IS4800 into the final product, be sure to eliminate all possible means of shorting *Resistors R3* and *R25* in the IS4800. A short could enable the scan engine to emit Class 3R radiation. Any CDRH filing will require a disclosure of the design ensuring a method to mitigate a potential short.

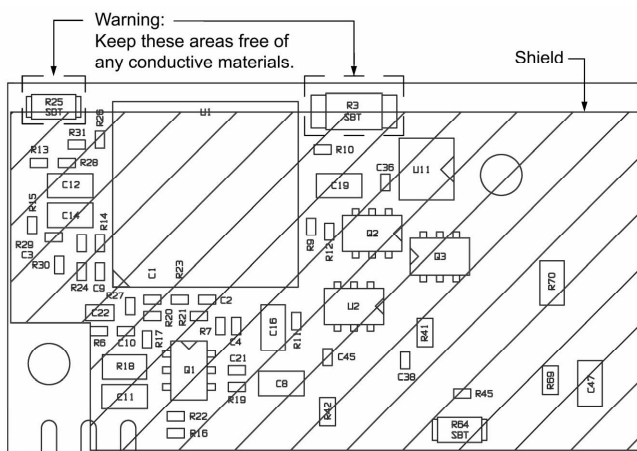


Figure 5. IS4800 PCB Clearance Warning

## Airborne Contaminants and Foreign Materials

The scan engine has very sensitive miniature electrical and optical components that must be protected from airborne contaminants and foreign materials. In order to prevent permanently damaging the scan engine and voiding the limited warranty (on page 23), the scan engine enclosure must be:

- Sealed to prevent infiltration by airborne contaminants and foreign materials such as dust, dirt, smoke, and smog.
- Sealed to protect against water, humidity and be non-condensing.

## Beam Clearance

- Keep the scan engine's beam sweep free from obstructions. For detailed information on the exit beam angle and location please refer to *Exit Beam Specifications* on page 4.
- A dark matte-finish on the internal walls of the housing can be utilized to avoid internal beam reflections.

### Enclosure Specifications

#### Output Window Properties



Please contact a Metrologic representative to coordinate the best window material required to maintain laser safety requirements for your application.

An improperly placed window has the potential to seriously reduce the scan engine's performance. Careful consideration must be made when designing the output window's distance and angle placement relative to the scan engine's exit beam and chassis.

Follow these guidelines when designing the output window.

- Acceptable window materials include; Acrylic (cast or molded), float glass, CR-39, and Polycarbonate.



Molded polycarbonate is high in strength but might exhibit a phenomenon called birefringence. Birefringence refers to multiple indices of refraction within one material. This condition will induce polarization effects that can be detrimental to scan performance of the engine. Check with a Metrologic representative before utilizing a transparent polycarbonate material for the output window.

- The exit window material should have a spectral transmission of at least 85% from 640 nm to 690 nm and should block shorter wavelengths.
- Red cell-cast acrylic is recommended.
- The exit window should exhibit a wavefront distortion (transmission) of no more than 0.2 wavelengths peak-to-valley maximum over any 0.08" diameter within the clear aperture.
- The clear aperture of the output window should extend beyond the 54° beam sweep (see *Exit Beam Specifications* on page 4).
- It should have a 60-40 surface quality and be optically flat, clear, free of scratches, pits, or seeds. If possible recess the window into the housing for protection or apply a scratch resistance coating (see *Output Window Coatings* on page 8).
- Apply an anti-reflective coating to the window surfaces to reduce the possibility of reflective light interfering with the engine's performance due to the window angle (see *Output Window Coatings* on page 8).

### Enclosure Specifications

#### Output Window Coatings

- Anti-Reflection

An anti-reflective coating can be applied to the inside and/or outside of the window to reduce the possibility of internal beam reflections interfering with the scan performance of the engine. If an anti-reflective coating is applied it is recommended that it be on both sides of the window providing a 0.5% maximum reflectivity on each side from 640 to 690 nanometers at the nominal window tilt angle. The coating must also meet the hardness adherence requirements of MIL-M-13508.

- Polysiloxane Coating

Applying a polysiloxane coating to the window surface can help protect the window from surface scratches and abrasions that may interfere with the scan performance of the engine. Recessing the window into the housing can also provide added protection against surface damage such as scratches and chips. If an anti-reflective coating is used, there is no need to apply a polysiloxane coating.

#### Output Window Angle

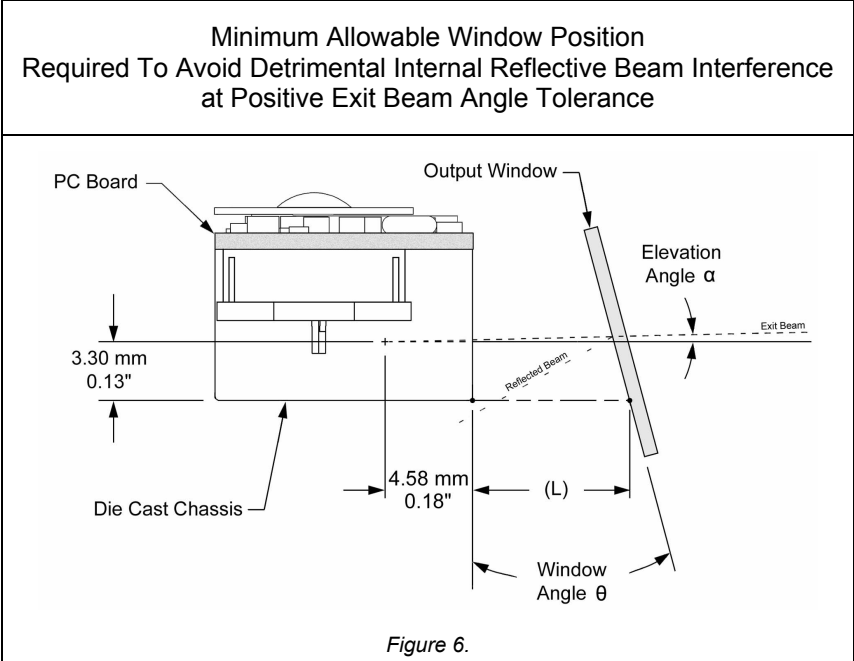


An improperly placed window has the potential to seriously reduce the scan engine's performance. Careful consideration must be made when designing the output window's distance and angle placement relative to the scan engine's exit beam and chassis.

It is important that angle of the window not be perpendicular to the exit beam of the scan engine. The angle of the window can cause the beam's laser light to reflect off the inside of the window back into the scan engine's optics ultimately degrading the engine's performance.

Please refer to the figures on page 9 and page 10 for specifications on the minimum allowable window angle required to avoid reflective beam interference.

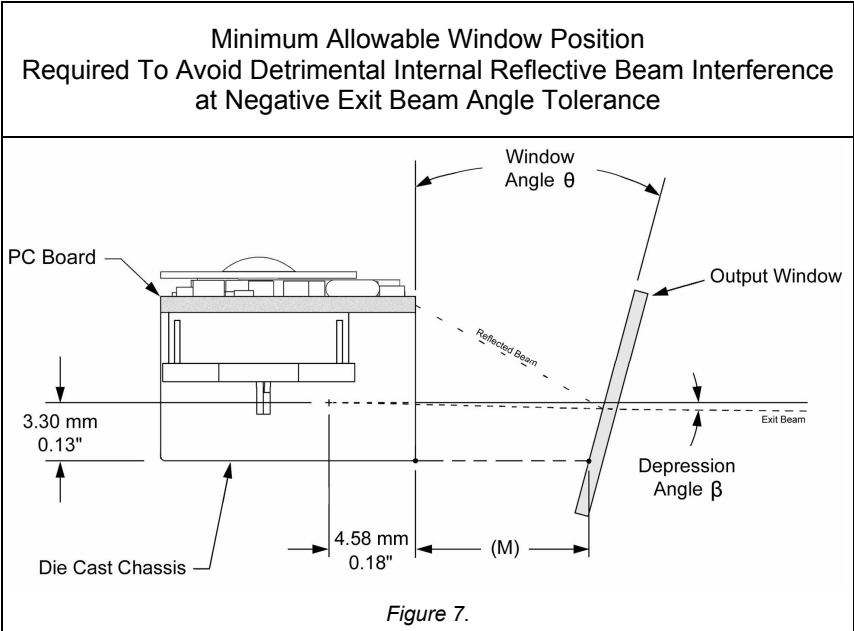
Enclosure Specifications



Exit Beam Elevation Angle $\alpha$	Minimum Projected Distance from the Engine's Base to the Window's Internal Surface (L)	Minimum Window Angle $\theta$
+2.5°	5.0	28.0°
+2.5°	10.0	14.5°
+2.5°	15.0	10.5°
+2.5°	20.0	8.0°
+2.5°	25.0	7.0°
+2.5°	30.0	6.5°
+2.5°	35.0	6.0°
+2.5°	40.0	5.5°
+2.5°	45.0	5.0°
+2.5°	50.0	5.0°

*Specifications are subject to change without notice.*

Enclosure Specifications



Exit Beam Depression Angle $\beta$	Minimum Projected Distance from the Engine's Base to the Window's Internal Surface (M)	Minimum Window Angle $\theta$
-2.5°	5.0	23.5°
-2.5°	10.0	16.5°
-2.5°	15.0	12.5°
-2.5°	20.0	10.5°
-2.5°	25.0	9.0°
-2.5°	30.0	8.0°
-2.5°	35.0	7.5°
-2.5°	40.0	7.0°
-2.5°	45.0	6.5°
-2.5°	50.0	6.0°

*Specifications are subject to change without notice.*

# DEPTH OF FIELD VS MINIMUM BAR CODE ELEMENT

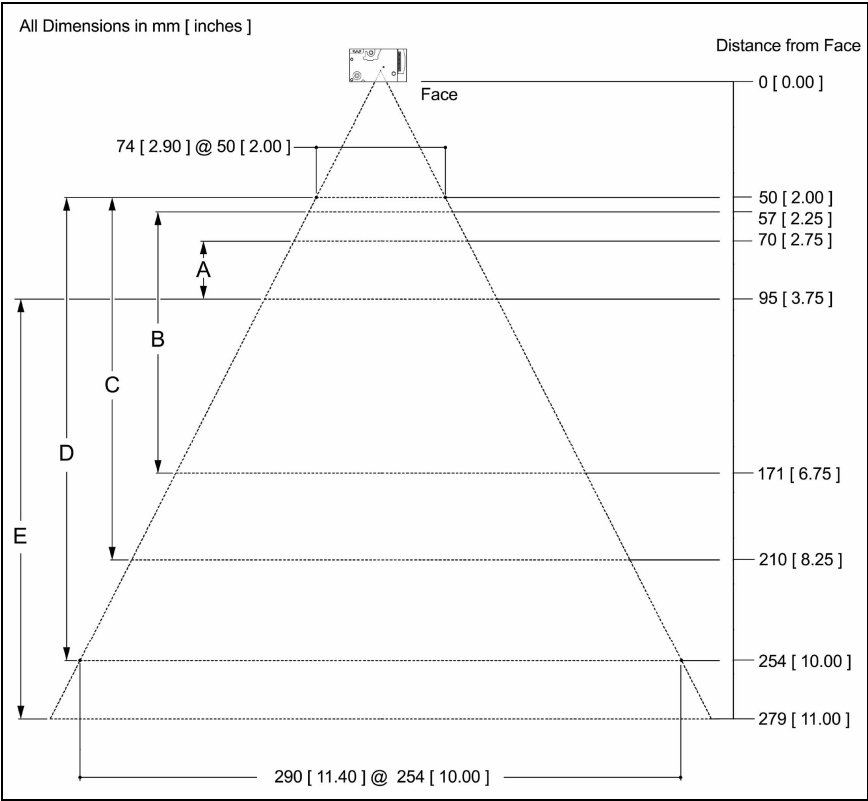


Figure 8. Depth of Field vs Minimum Bar Code Element

MINIMUM BAR CODE ELEMENT WIDTH					
	A	B	C	D	E
mm	.13	.19	.26	.33	.49
mils	5.2	7.5	10.4	13	19.5

For additional information please refer to the *Barcode Element Time Calculation* on page 17.

## DESIGN SPECIFICATIONS

---

IS4800 Series Engine	
Operational	
Light Source:	Visible Laser Diode (VLD) @ 650 nm
Laser Power:	1 mW
Depth of Scan Field:	50 mm – 254 mm (2" – 10") for 0.33 mm (13 mil) bar codes
Width of Scan Field:	74 mm (2.9") @ 50 mm (2.0"); 290 mm (11.4") @ 254 mm (10.0")
Scan Speed:	100 Scan Lines per Second Typical
Scan Pattern:	Single Scan Line
Minimum Bar Width:	0.127 mm (5.0 mil)
Print Contrast:	35% Minimum Reflectance Difference
Number Characters Read:	Decode Dependent
Roll, Pitch, Yaw	42°, 68°, 52°
Mechanical	
Dimensions (maximum):	24.7 mm x 14.6 mm x 11.9 mm (.97" x 0.57" x 0.47")
Weight (maximum):	11 g (0.39 oz)
Termination:	10-pin ZIF Connector
Mounting:	2 Mounting Points, M1.6 mm Threaded, 2 mm Maximum Depth
Locators:	2 Locating Points, 0.8 mm Diameter, 1.0 mm Depth

*Specifications are subject to change without notice.*

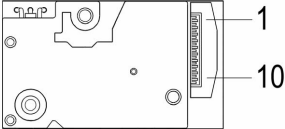


## DESIGN SPECIFICATIONS

IS4800 Engine Series	
Electrical	
Input Voltage:	IS4813 Engine 3.3VDC $\pm$ 10%
	IS4815 Engine 5.0VDC $\pm$ 5%
Power Consumption:	IS4813 Engine 412.5 mW
	IS4815 Engine 500 mW
Operating Current:	IS4813 Engine < 125 mA @ 3.3VDC
	IS4815 Engine < 100 mA @ 5.0VDC
Standby Current:	IS4813 Engine < 20 mA @ 3.3VDC
	IS4815 Engine < 10 mA @ 5.0VDC
Laser Class:	See Laser and Product Safety on page 18
EMC:	See Laser and Product Safety on page 18
Environmental	
Operating Temperature:	-20°C to 50°C (-4°F to 122°F)
Storage Temperature:	-40°C to 70°C (-40°F to 158°F)
Humidity:	5% to 95% relative humidity, non-condensing
Light Levels:	Sunlight: 107,000 Lux (10,000 ft-candles) Ambient: 4842 Lux (450 ft-candles)
Shock:	2000 G

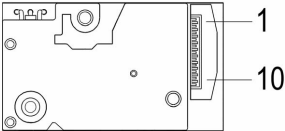
*Specifications are subject to change without notice.*

IS4813 Pinout Connections

IS4813 10-Pin ZIF		
		
Figure 9. 10-Pin ZIF		
Pin	Signal Name	Function
1	No Connect	No Connect
2	Power	3.3V ± 10%
3	No Connect	No Connect
4	Laser Enable*	High = Laser OFF Low = Laser ON, only if pin 5 (scan enable) is also Low
5	Scan Enable*	High = Engine OFF Low = Engine ON
6	Digitized Bar Pattern	High = Bar Low = Space
7	Start of Scan	Level changes from high to low, or low to high, when the laser changes direction at the start of the scan line.
8	Ground	Power Ground
9	Ground	Power Ground
10	No Connect	No Connect

\* See Scan Sense Timing on page 16.

IS4815 Pinout Connections

IS4815 10-Pin ZIF		
		
Figure 10. 10-Pin ZIF		
Pin	Signal Name	Function
1	No Connect	No Connect
2	Power	5.0V ± 5%
3	No Connect	No Connect
4	Laser Enable*	High = Laser OFF Low = Laser ON, only if pin 5 (scan enable) is also Low
5	Scan Enable*	High = Engine OFF Low = Engine ON
6	Digitized Bar Pattern	High = Bar Low = Space
7	Start of Scan	Level changes from high to low, or low to high, when the laser changes direction at the start of the scan line.
8	Ground	Power Ground
9	Ground	Power Ground
10	No Connect	No Connect

\* See Scan Sense Timing on page 16.

### Timing Diagram

The Timing Diagram (see Figure below) illustrates the correct power up procedure to ensure that the laser diode is not damaged upon start up of the unit. Upon start up, both scan Enable and Laser Enable are to be held high. In this state, both the scan mirror and the laser diode are not functional.

A minimum of 2ms after the unit has obtained the proper working voltage; Scan Enable can be driven low to turn on the scan mirror. A minimum of 50 ms must elapse after enabling the scan before driving the Laser Enable low to turn on the laser diode.

**Caution:** The laser is susceptible to permanent damage if enabled less than 50 ms after the Scan Enable has been activated. This requirement must be strictly adhered to or the limited warranty on **page 23** is void.

The unit is now ready to scan bar code data.

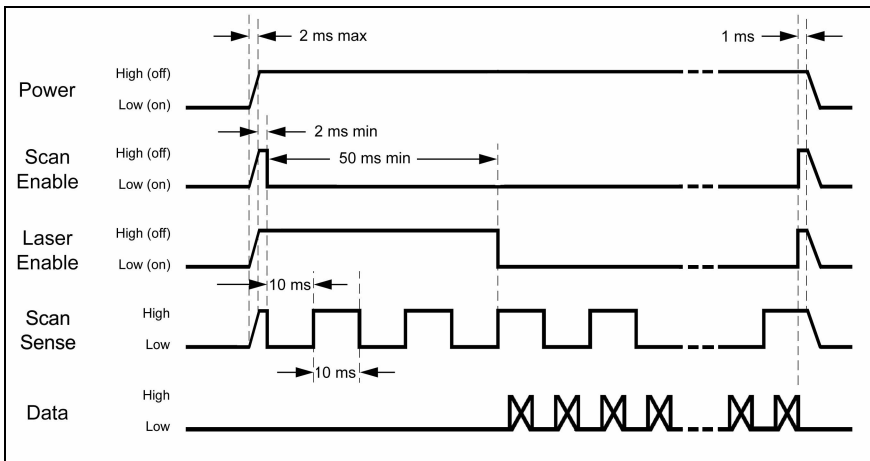


Figure 11. Timing Diagram

### Scan Sense

The scan sense signal is a 50% duty cycle square wave with the transitions from High to Low indicating a change in the scan direction, (see Figure 10). Valid scan data occurs between these transitions.

If scan enable is High (off) the scan sense signal will stay High. If for some reason the scan mirror is stopped (damage for example) when Scan enable is Low (on) then Scan Sense will remain High.

### Barcode Element Time Calculation

Realization of the full depth of field for all barcodes given in the specification is based on the ability of the decoding hardware to resolve a varying range of minimum element times. The minimum element time calculation for a given barcode size at a given distance is shown in Equation 1 (*below*).

$$\text{Minimum Element Time} = (\text{Element Size} / \text{Spot Speed})$$

*Equation 1.*

#### Example:

Barcode Size = 5.2 mil

Spot Speed @ 95 mm from face = 650 inches/second

Minimum Element Time = (0.0052 inches/ (650 inches/second)) = 8.0  $\mu$ sec

### Regulatory Requirements



THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040.  
USE ONLY AS COMPONENT.

The IS4800 Series microQuest Laser Scan engines are designed to meet the requirements of IEC Class 2 in accordance with IEC 60825-1:1993+A1:1997+A2:2001. IEC Class 2 is defined as follows:

Emission Duration:	Greater than 0.25 seconds
Accessible Emission Limit:	Less than 0.001 W (1.0 milliwatts) average radiant power

The IS4800 series laser scan engine is registered with the Center for Devices and Radiological Health as a laser “component”. The addition of shut-down controls, labeling and informational requirements are necessary to achieve compliance with the performance standard published in the Code of Federal Regulations (CFR), Title 21 Parts 1040.10 and 1040.11. Therefore, **it is the responsibility of the manufacturer who incorporates the scan engine into their product to provide the additional performance, labeling and informational requirements necessary to comply with all federal laser safety regulations.**

The specifications required for agency approval are not obtainable until the microQuest engine is used in its final configuration. Metrologic is unable to fulfill these requirements because the scan engine will operate differently depending upon where it is used as a component. The following information concerning the scan engine appears on the shipping label:

THIS DEVICE DOES NOT COMPLY WITH 21 CFR 1040.  
USE ONLY AS A COMPONENT.

Manufacturers incorporating unmodified microQuest engines into their product may reference the following accession number on items in their Laser Product Report that request information concerning features inherent in the microQuest engine design.

Accession Number: Pending

If the product is to be used in another country, **it is the responsibility of the manufacturer who incorporates the scan engine into their product** to fulfill any regulatory compliance requirements for that country. Refer to one of the following sections for further explanation.

### Europe

The CE Mark is required on products which incorporate the IS4813 and the IS4815 scan engines if the products are to be imported into European Economic Area (EEA) countries. Use of the CE Mark requires compliance with directives and standards dependent upon the type of product. Information may be found at <http://europa.eu.int/comm/enterprise/newapproach/>.

#### Laser Safety

IEC 60825-1:1993+A1:1997+A2:2001,  
EN 60825-1:1994+A2:2001+A1:2002  
“Safety of Laser products”

Compliance with either of the standards listed above is required for the product to bear the CE mark.

Note: Non EEA countries may impose additional testing/certification requirements.

#### EMC

Certain combinations of microQuest scan engines and associated electronics may require certification of compliance with the European EMC Directive. EMC compliance of finished products in Europe can be accomplished by the following method:

- The manufacturer may certify to the EC’s Electromagnetic Compatibility Directive 89/336/EEC. Compliance is required for the product to bear the CE Mark.

Note: Non EEA countries may impose additional testing/certification requirements.

#### Electrical Safety

The scan engines are built to conform to the European Low Voltage Directive 73/23/ EEC.

### United States

#### Laser Safety

To assist with the FDA filing requirements (refer to Regulatory Requirements), Metrologic has registered the scan engine with the FDA as a component. Customers can contact CDRH at the following address:

Food and Drug Administration  
Center for Devices and Radiological Health  
Light Products Branch (HFX-312)  
Office of Compliance  
2098 Gaither Road  
Rockville, MD 20850  
Tel: 301-594-4654  
[www.fda.gov/cdrh](http://www.fda.gov/cdrh)

Requirements for laser products are described in CFR (Code of Federal Regulation) Title 21, part 1040.10 & 1040.11 from the Government Printing Office. Copies can be ordered by calling 202-512-1800, ordering on line from [www.access.gpo.gov](http://www.access.gpo.gov) or writing to:

Superintendent of Documents  
PO Box 371954  
Pittsburgh, PA 15250-7954

**Note:** State and local governments may regulate the use products containing lasers. The manufacturer should consult the applicable government regulations for more information.

Copies of Product Reporting Guides, other guides, and related documents are available as PDF documents from the CDRH website at: [www.fda.gov/cdrh/comp/eprc.html](http://www.fda.gov/cdrh/comp/eprc.html). Additional resources include the Division of Small Manufacturers, International and Consumer Assistance (DSMICA) in Rockville, Maryland at 1-800-638-2041.

#### EMC

Certain combinations of scan engines and associated electronics may require testing to insure compliance with the following Federal Communications Commission regulation: 47 CFR Part 15

**Note:** When using the scan engine with RF equipment, modems, etc. may require examination(s) to the standard(s) for the specific equipment combination. It is the manufacturers' responsibility to comply with the applicable federal regulation(s).



### Canada

#### Laser Safety

The Radiation Protection Bureau currently accepts products meeting the FDA standards in Canada. For more information contact:

Radiation Protection Bureau  
775 Brookfield Road  
Ottawa, Ontario K1A 1C1

#### EMC

Products meeting FCC 47 CFR Part 15 will meet Industry Canada interference-causing equipment standard for digital apparatus, ICES-003. Additional testing is not required.

A written notice indicating compliance must accompany the apparatus to the end user. The notice shall be in the form of a label that is affixed to the apparatus. The notice may be in the form of a statement included in the user's manual if, because of insufficient space or other restrictions, it is not feasible to affix a label to the apparatus.

### Cautions

#### **Caution**

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous laser light exposure. Under no circumstances should the customer attempt to service the laser scanner. Never attempt to look at the laser beam, even if the scanner appears to be nonfunctional. Never open the scanner in an attempt to look into the device. Doing so could result in hazardous laser light exposure. The use of optical instruments with the laser equipment will increase eye hazard.

#### **Atención**

La modificación de los procedimientos, o la utilización de controles o ajustes distintos de los especificados aquí, pueden provocar una luz de láser peligrosa. Bajo ninguna circunstancia el usuario deberá realizar el mantenimiento del láser del escáner. Ni intentar mirar al haz del láser incluso cuando este no esté operativo. Tampoco deberá abrir el escáner para examinar el aparato. El hacerlo puede conllevar una exposición peligrosa a la luz de láser. El uso de instrumentos ópticos con el equipo láser puede incrementar el riesgo para la vista.

#### **Attention**

L'emploi de commandes, réglages ou procédés autres que ceux décrits ici peut entraîner de graves irradiations. Le client ne doit en aucun cas essayer d'entretenir lui-même le scanner ou le laser. Ne regardez jamais directement le rayon laser, même si vous croyez que le scanner est inactif. N'ouvrez jamais le scanner pour regarder dans l'appareil. Ce faisant, vous vous exposez à une rayonnement laser qui est dangereux. L'emploi d'appareils optiques avec cet équipement laser augmente le risque d'endommagement de la vision.

#### **Achtung**

Die Verwendung anderer als der hier beschriebenen Steuerungen, Einstellungen oder Verfahren kann eine gefährliche Laserstrahlung hervorrufen. Der Kunde sollte unter keinen Umständen versuchen, den Laser-Scanner selbst zu warten. Sehen Sie niemals in den Laserstrahl, selbst wenn Sie glauben, daß der Scanner nicht aktiv ist. Öffnen Sie niemals den Scanner, um in das Gerät hineinzusehen. Wenn Sie dies tun, können Sie sich einer gefährlichen Laserstrahlung aussetzen. Der Einsatz optischer Geräte mit dieser Laserausrüstung erhöht das Risiko einer Sehschädigung.

#### **Attenzione**

L'utilizzo di sistemi di controllo, di regolazioni o di procedimenti diversi da quelli descritti nel presente Manuale può provocare delle esposizioni a raggi laser rischiose. Il cliente non deve assolutamente tentare di riparare egli stesso lo scanner laser. Non guardate mai il raggio laser, anche se credete che lo scanner non sia attivo. Non aprite mai lo scanner per guardare dentro l'apparecchio. Facendolo potete esporvi ad una esposizione laser rischiosa. L'uso di apparecchi ottici, equipaggiati con raggi laser, aumenta il rischio di danni alla vista.

## LIMITED WARRANTY

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The IS4800 microQuest® series scan engines are manufactured by Metrologic at its Blackwood, New Jersey, USA facility and its Suzhou, China facility. The microQuest scan engines have a two (2) year limited warranty from the date of manufacture. Metrologic warrants and represents that all microQuest scan engines are free of all defects in material, workmanship and design, and have been produced and labeled in compliance with all applicable US Federal, state and local laws, regulations and ordinances pertaining to their production and labeling.

This warranty is limited to repair, replacement of product or refund of product price at the sole discretion of Metrologic. Faulty equipment must be returned to one of the following Metrologic repair facilities: Blackwood, New Jersey, USA; Madrid, Spain; or Suzhou, China. To do this, contact the appropriate Metrologic Customer Service/Repair Department to obtain a Returned Material Authorization (RMA) number.

In the event that it is determined that the equipment failure is covered under the warranty, Metrologic shall, at its sole option, repair the Product or replace the Product with a functionally equivalent unit and return such repaired or replaced Product without charge for service or return freight, whether distributor, dealer/reseller, or retail consumer, or refund an amount equal to the original purchase price.

This limited warranty does not extend to any Product which, in the sole judgment of Metrologic, has been subjected to abuse, misuse, neglect, improper installation or handling or is damaged as a result of a failure to follow instructions contained in this manual or other documentation provided with the Product. The warranty is void if the Product is not encased in a properly designed enclosure (sealed to: (a) prevent infiltration by airborne contaminants; (b) protect against ESD, humidity and mechanical shocks; and (c) be non-condensing) or Product is opened by anyone other than Metrologic's repair department or authorized repair centers. For additional information on enclosure design, see pages 5 -10 of the Installation Guide.

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## PATENTS

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Worldwide patents pending.

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